

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A semiconductor device comprising:

an insulating film formed on a substrate provided with a transistor and having an opening portion;

a conductive film formed in the opening portion; and

a capacitor formed on the conductive film and comprising a first electrode, a ferroelectric film and a second electrode;

wherein the ferroelectric film includes at least one element selected from the group consisting of lead, barium and bismuth and formed from above the first electrode to above the insulating film;

wherein a reaction barrier film is provided between the insulating film and the ferroelectric film to prevent a reaction between the insulating film and the ferroelectric film, said reaction barrier film being in contact with a lower surface of said first electrode such that the reaction barrier film is interposed between the lower surface of the first electrode and said insulating film;

wherein a diffusion barrier film is provided between the conductive film and the first electrode and side faces of the diffusion barrier are not brought into contact with the ferroelectric film;

wherein an upper surface of said diffusion barrier film and an upper surface of said reaction barrier film are substantially on a same plane and thicknesses of said diffusion barrier film and said reaction barrier film are substantially the same; and

wherein side faces of the first electrode are provided to be brought into contact with the ferroelectric film.

2. (Original) The semiconductor device according to claim 1:

wherein the ferroelectric film comprises any of the group consisting of lead titanate zirconate, lead titanate, barium lead titanate zirconate, barium lead niobate, strontium bismuth tantalite, bismuth titanate and barium strontium titanate zirconate.

3. (Original) The semiconductor device according to claim 1:

wherein the reaction barrier layer comprises any of the group consisting of titanium oxide, alumina and bismuth silicate.

4. (Original) The semiconductor device according to claim 1:

wherein the diffusion barrier film is a film comprising any of or laminated with any of the group consisting of Ti, Ta, TiN, $\text{Al}_x\text{Ti}_{1-x}\text{N}$ and WN.

5. – 6. (Cancelled)

7. (Currently Amended) A semiconductor device comprising:

a substrate provided with a transistor;

an insulating film formed on the substrate and having an opening portion;

a conductive film formed in the opening portion; and
a capacitor formed on the conductive film and comprising a first electrode; a ferroelectrics film and a second electrode;

wherein the ferroelectric film includes at least one element selected from the group consisting of lead, barium and bismuth and formed on an upper face and side faces of the first electrode and on the insulating film;

wherein a reaction barrier film is provided between the insulating film and the ferroelectric film to prevent a reaction between the insulating film and the ferroelectric film, said reaction barrier film being in contact with a lower surface of said first electrode such that the reaction barrier film is interposed between the lower surface of the first electrode and said insulating film;

wherein a diffusion barrier film is provided between the conductive film and the first electrode and in the opening portion of the reaction barrier film; and

wherein an upper surface of said diffusion barrier film and an upper surface of said reaction barrier film are substantially on a same plane and thicknesses of said diffusion barrier film and said reaction barrier film are substantially the same.

8. (Original) The semiconductor device according to claim 7:

wherein side faces of the diffusion barrier film are not brought into contact with the ferroelectric film.

9. (Original) The semiconductor device according to claim 7:

wherein the ferroelectric film comprises any of the group consisting of lead titanate zirconate, lead titanate, barium lead titanate zirconate, barium lead niobate, strontium bismuth tantalite, bismuth titanate and barium strontium titanate zirconate.

10. (Original) The semiconductor device according to claim 7:

wherein the reaction barrier layer comprises any of the group consisting of titanium oxide, alumina and bismuth silicate.

11. (Original) The semiconductor device according to claim 7:

wherein the diffusion barrier film is a film comprising any of or laminated with any of the group consisting of Ti, Ta, TiN, $\text{Al}_x\text{Ti}_{1-x}\text{N}$ and WN.

12. – 13. (Cancelled)

14. (Currently Amended) A semiconductor device comprising:

a substrate having a transistor;

an insulating film formed on the substrate and having an opening portion extending completely through said insulating film;

a diffusion barrier layer provided in the opening portion to extend completely through the insulating film to form a plug, wherein said diffusion barrier layer comprising said plug is connected to the transistor;

a reaction barrier film provided on the insulating film;

a first electrode electrically connected to the diffusion barrier layer and in contact with a top surface of said insulating film, wherein said reaction barrier film is provided in self-alignment with said first electrode and wherein said reaction barrier film is located outside of said first electrode and does not extend under said first electrode;

a ferroelectric film provided on the first electrode and including at least one element selected from the group consisting of lead, barium and bismuth; and

a second electrode provided on the ferroelectric film.

15. (Original) The semiconductor device according to claim 14:

wherein the ferroelectric film is formed over an upper face and side faces of the first electrode.

16. (Original) The semiconductor device according to claim 14:

wherein the ferroelectric film comprises any of the group consisting of lead titanate zirconate, lead titanate, barium lead titanate zirconate, barium lead niobate, strontium bismuth tantalite, bismuth titanate and barium strontium titanate zirconate.

17. (Original) The semiconductor device according to claim 14:

wherein the reaction barrier layer comprises any of the group consisting of titanium oxide, alumina and bismuth silicate.

18. (Original) The semiconductor device according to claim 14:

wherein the diffusion barrier film is a film comprising any of or laminated with any of the group consisting of Ti, Ta, TiN, $\text{Al}_x\text{Ti}_{1-x}\text{N}$ and WN.

19. – 28. (Cancelled)

29. (Previously Presented) A semiconductor device according to claim 14, wherein the diffusion barrier is in direct contact with a lower surface of the first electrode.

30. (Currently Amended) A semiconductor device comprising:

an insulating film formed on a substrate provided with a transistor and having an opening portion;

a conductive film formed in the opening portion;

a capacitor formed on the conductive film and comprising a first electrode, a ferroelectric film and a second electrode, wherein the ferroelectric film includes at least one element selected from the group consisting of lead, barium and bismuth and formed from above the first electrode to above the insulating film; and

means for preventing a reaction between the insulating film and the ferroelectric film, said means for preventing a reaction being in contact with a lower surface of said first electrode such that the means for preventing a reaction is interposed between the lower surface of the first electrode and said insulating film;

wherein a diffusion barrier film is provided between the conductive film and the first electrode and side faces of the diffusion barrier are not brought into contact with the ferroelectric film;

wherein an upper surface of said diffusion barrier film and an upper surface of said means for preventing a reaction are substantially on a same plane and thicknesses of said diffusion barrier film and said means for preventing a reaction are substantially the same; and

wherein side faces of the first electrode are provided to be brought into contact with the ferroelectric film.

31. (Previously Presented) A semiconductor device according to claim 30, wherein said means for preventing a reaction comprises a TiO_2 film.

32. (Currently Amended) A semiconductor device comprising:

a substrate provided with a transistor;

an insulating film formed on the substrate and having an opening portion;

a conductive film formed in the opening portion,

a capacitor formed on the conductive film and comprising a first electrode; a ferroelectrics film and a second electrode, wherein the ferroelectric film includes at least one element selected from the group consisting of lead, barium and bismuth and formed on an upper face and side faces of the first electrode and on the insulating film; and

means for preventing a reaction between the insulating film and the ferroelectric film, said means for preventing a reaction being in contact with a lower

surface of said first electrode such that the means for preventing a reaction is interposed between the lower surface of the first electrode and said insulating film;

wherein a diffusion barrier film is provided between the conductive film and the first electrode and in the opening portion of the means for preventing a reaction; and

wherein an upper surface of said diffusion barrier film and an upper surface of said means for preventing a reaction are substantially on a same plane and thicknesses of said diffusion barrier film and said means for preventing a reaction are substantially the same.

33. (Previously Presented) A semiconductor device according to claim 32, wherein said means for preventing a reaction comprises a TiO_2 film.